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AN IMPROVED APPARATUS FOR OBSERVING AEROSOL SOLUTIONS AND DETERMINING FREON-INSOLUBLE MATTER IN PYRETHRUM EXTRACT

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A glass container for studying aerosol solutions and the method of filling it were described by Fulton et al. in 1947 (1, 2). This container was later modified by Hazen and Fulton (3) for the determination of Freon-insoluble matter in pyrethrum extract. The apparatus has since been improved to withstand higher pressures and to provide the operator with protection while handling the individual units.

Description of Apparatus

The apparatus shown in figure 1 was constructed from a strong glass bottle, commonly used in the drugstore trade for citrate of magnesia, with a special pressure cap and needle valve. The cap (C), which is held tightly on the bottle by an adjustable frame provided with a tightening screw (E), was constructed from 1 1/4-inch round brass stock by machining on a turning lathe to the same shape as the glass stopper furnished with the bottle. The lower end of the cap was then drilled to a depth of 1 1/4 inches with a 3/16-inch drill and then at right angles on the side for the outlet to the valve. The lower end of the cap was then drilled to a depth of 3/16 inch with a 5/16-inch drill. This opening was threaded on the lathe to a 13/32-inch by 36 thread to fit the filter-screen unit (B) commonly used on oil-burner tips. The side outlet was drilled to a depth of 3/8 inch with a 5/16-inch drill and threaded with a 1/8-inch pipe tap. A depression was made in the center of the top of the cap to hold a 3/8-inch ball bearing (D).

The frame (A) for the bottle was constructed from two 3/8-inch steel rods threaded on both ends. The upper end of each rod was threaded for a distance of 2 inches to permit adjustment of the crossbar for irregular shaped bottles. The crossbar was made from 1/2- by 1 1/4-inch brass stock and drilled with two 3/8-inch holes 2 inches apart. The pressure

screw hole was then made with a 5/16-inch drill and threaded with a 3/8-inch tap. The end of the pressure screw was recessed with a 3/8-inch drill to hold the ball bearing. The base for the frame (J) was made from 4-inch round brass stock. After a 1/2-inch section had been cut from the brass stock, a depression was made in the center 3/16 inch deep and 2 3/4 inches in diameter to hold the bottom of the bottle in place. A 2 3/4-inch disk was cut from a 1/8-inch rubber stock to serve as a cushion between the bottom of the bottle and the brass base. Two 5/16-inch holes were then drilled diametrically opposite in the base and threaded with a 3/8-inch tap. The steel rods were heated to a cherry red and bent in the shape shown in figure 1. The correct adjustment of the height of the crossbar was then made by placing the bottle in the frame and turning the lock nuts to obtain sufficient clearance for removing the bottle. The ball bearing was used to obtain uniform pressure on the neoprene washer in the top of the bottle. The safety shield (F) was made by cutting a 7-inch section from 3 3/4-inch Lucite tubing. By cutting a notch (H) in the tubing 1 1/2 inches deep, it was possible to adjust the needle valve (G) and still have the shield extend above the level of the bottle for maximum protection.

How Apparatus is Used

When the apparatus is being used for the determination of Freon-insoluble matter in pyrethrum extract, the filter unit (B) filled with lamb's wool is attached to the pressure cap (C) as shown. Prior to use the pressure cap and filter unit are washed with acetone and chloroform. The bottle is then cleaned with a 1:9 mixture of ethyl alcohol and sulfuric acid, and later rinsed several times with distilled water. All parts are dried in an oven at 105° C. for 1 hour and then cooled in a desiccator.

After the insecticide material dissolved in suitable solvents has been placed in the bottle, the apparatus is assembled as shown in figure 1. The unit is evacuated and then connected by a refrigeration hose to a supply of Freon-12 (dichlorodifluoromethane). The tank valve is opened to fill the hose with the liquefied gas. The bottle is weighed and additional weights equivalent to the amount of propellent gas to be added are then placed on the balance pan. The needle valve (G) on the bottle is opened to allow the Freon to flow from the reservoir and closed when the calculated amount has been added.

The frame and pressure cap may be used with different-shaped bottles, such as those used in the carbonated beverage trade. The citrate of magnesia bottles will withstand safely pressure up to 200 pounds per square inch, but any glass under continuous strain will fatigue. It is suggested as a precautionary measure that bottles allowed to stand for any period be kept behind a safety-glass screen.

Literature Cited

(1) Fulton, R. A., and Berlin, F. D.
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(3) Hazen, A. C., and Fulton, R. A.
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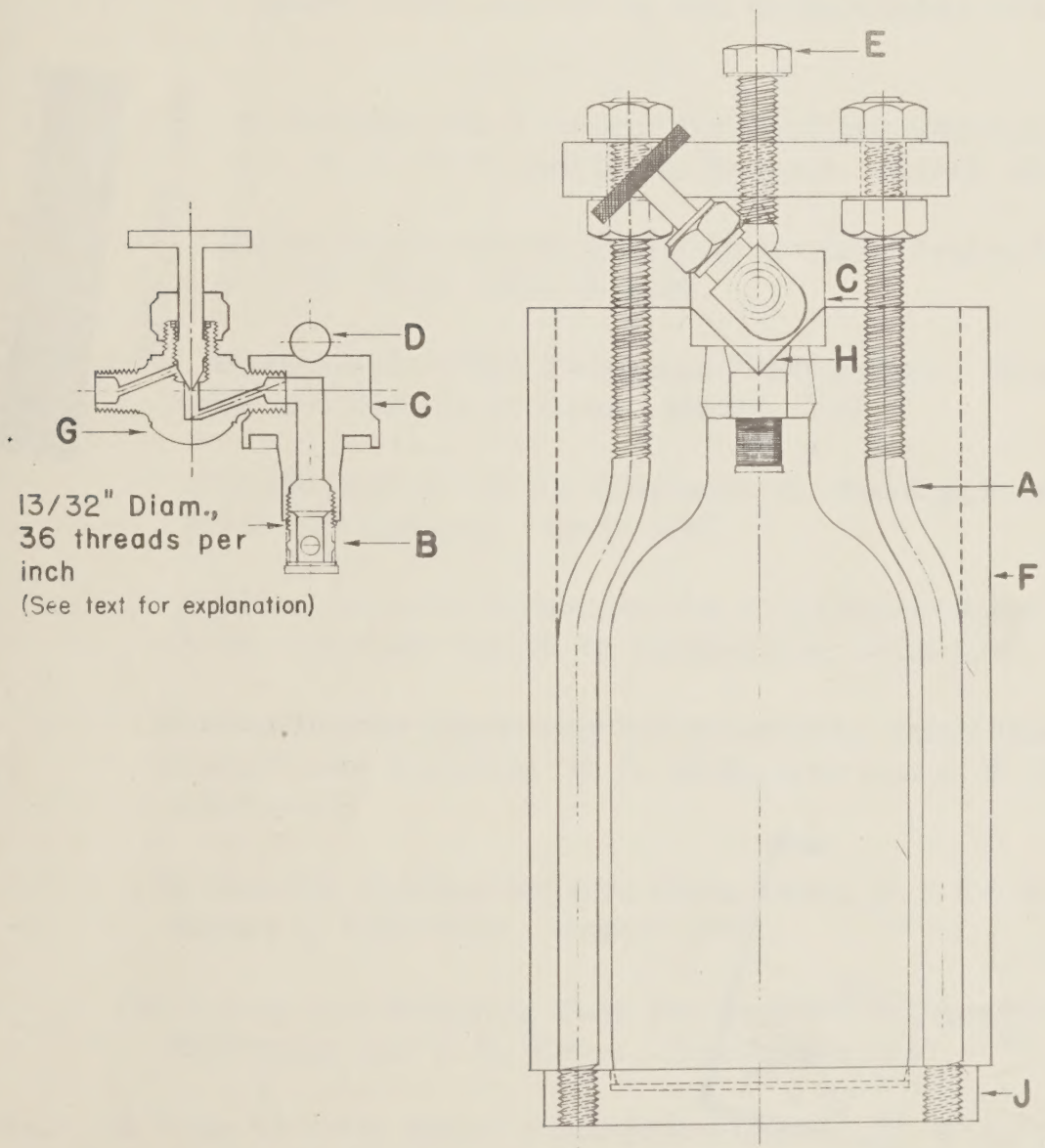

Figure 1.--Apparatus for observing aerosol solutions and determining Freon-insoluble matter in pyrethrum extract, showing arrangements of integral parts. See text for explanation of letters.